

CLAIMS

We claim:

- 5 1. An apparatus, comprising:
a substrate;
a sensing element that is responsive to incident light, including at least one layer
of optically transmissive material formed over the substrate; and
10 an optical device formed over the substrate.
2. The apparatus as in claim 1, wherein the optical device is a diffractive optical element
- 15 3. The apparatus as in claim 2, wherein the diffractive optical element is
a plurality of stacked layers of optically transmissive material upon the substrate,
4. The apparatus as in claim 3, further comprising:
20 a light source positioned to transmit light through the sensing element and the
diffractive optical element.
5. The apparatus as in claim 4, further comprising:
25 a control circuit coupled to the sensing element for measuring the response of the
sensing element to incident light, and for controlling the light source.
6. The apparatus as in claim 5, wherein the light source is a laser.
- 30 7. The apparatus as in claim 3, wherein the resistance of the sensing element is
responsive to incident light.
8. The apparatus as in claim 7, wherein the sensing element is at least one of the layers in
the diffractive optical element.
- 35 9. The apparatus as in claim 7, wherein the sensing element is adjacent to the diffractive
optical element.
10. The apparatus as in claim 7, further comprising:
40 a first and second contact on the sensing element for measuring the resistance of
the sensing element.
11. The apparatus as in claim 10, wherein the optically transmissive material includes a
45 semiconductor.

12. The apparatus as in claim 3, wherein the sensing element includes two layers of optically transmissive material that form a photovoltaic PN junction.
- 5 13. The apparatus as in claim 12, wherein the substrate is one of the layers that form a photovoltaic PN junction.
14. The apparatus as in claim 12, further comprising:
 - 10 a first contact on a first layer of the PN junction; and
 - a second contact on a second layer of the PN junction,
 - wherein the first and second contacts are used to measure an electrical
 - 15 characteristic of the PN junction.
- 15 15. The apparatus as in claim 12, wherein the sensing element is at least one of the layers in the diffractive optical element.
- 20 16. The apparatus as in claim 12, wherein the sensing element is adjacent to the diffractive optical element.
17. The apparatus as in claim 1, wherein the optical device is refractive.
- 25 18. The apparatus as in claim 1, wherein the optical device is reflective.
19. The apparatus as in claim 1, wherein the temperature of the sensing element is responsive to light.

30